TECHNICAL REVIEW DOCUMENT for OPERATING PERMIT 950PRB091

to be issued to:

Colorado Interstate Gas Greasewood Compressor Station Rio Blanco County Source ID 1030055

Prepared by Doris Jung on May 15, 1998

I. Purpose

This document will establish the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered within the Operating Permit proposed for this site. It is designed for reference during review of the proposed permit by the EPA and during Public Comment. The conclusions made in this report are based on information provided in the original application submittal of December 8, 1995 and additional information submitted December 15 and 23, 1997. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

On April 16, 1998 the Colorado Air Quality Control Commission directed the Division to implement new procedures regarding the use of short term emission and production/throughput limits on Construction permits. These procedures are being directly implemented in all operating permits that had not started their Public Comment period as of April 16, 1998. All short term emission and production/throughput limits that appeared in the construction permits associated with this facility that are not required by a specific State or Federal standard or by the above referenced Division procedures have been deleted and all annual emission and production/throughput limits converted to a rolling 12 month total. Note that, if applicable, appropriate modeling to demonstrate compliance with the National Ambient Air Quality Standards was conducted as part of the Construction Permit processing procedures. If required by this permit, portable monitoring results and/or EPA reference test method results will be multiplied by 8760 hours for comparison to annual emission limits unless there is a specific condition in the permit restricting hours of operation.

II. Source Description

This source is classified as a natural gas transmission facility defined under Standard Industrial Classification 4922. The equipment within the Greasewood Compressor Station are named according to the services they provide for billing purposes and company reference. Two (2) internal combustion engines are used for "Parachute" compression services. One (1) turbine is used for "Greasewood" compression services. All other equipment on site serves both compression services.

The source is located approximately six miles north of Piceance Creek on County Road 76, about 20 miles northwest of Rio Blanco, CO in an area designated as attainment for all criteria pollutants. The only affected state within 50 miles of the facility is Utah. The facility is within 100 kilometers of a Federal Class I designated area, Flat Tops Wilderness. The pollutants of concern are Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), and Hazardous Air Pollutants (HAPs). Facility wide potential emissions based on data submitted with the Title V application and actual emissions based on the APENs on file with the Division are as follows in tons per year (tpy):

Pollutant Potential Emissions (tpy)		Actual Emissions (tpy)		
NO_x	109.9	61.69		
CO	55.4	7.94		
VOC	18.1	1.03		
HAPs	1.94	0.09		

This source is considered to be a minor source (Potential to Emit < 250 tpy) for purposes of Prevention of Significant (PSD) regulations as defined in Colorado Regulation 3, Part A, Section I.B.59. This facility currently has no applicable MACTs. Colorado Interstate Gas (CIG) indicated that this source is not subject to 112(r). CIG certified to operating in compliance with all applicable requirements at the time of their application submittal on December 8, 1995.

III. Emission Sources

The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

Unit E001 - Allison Turbine, Model 501-KC5, Serial No. ASP 1469, 38.52 MMBtu/hr, 3304 hp, Natural Gas Fired.

1. Applicable Requirements

The original turbine with final approval Colorado Construction Permit 91RB570 was installed in 1992, two subsequent turbines replaced the original turbine in May 1996 and June 1998. The current turbine which is now subject to Colorado Construction Permit 91RB570 is subject to New Source Performance Standards (NSPS) Subpart GG requirements of Regulation No. 6, Part A - Standards of Performance for Stationary Gas Turbines (attached) and Subpart A - General Provisions (40 CFR 60 Subpart A). A comparison between the permit limit for NO_{x} (110.3 ppmvd) and the NSPS NO_{x} standard (136 ppmvd) showed that the permit limit is more stringent than NSPS. The NSPS NO_{x} standard has therefore been streamlined with the permit conditions for NO_{x} in the Operating Permit. The applicable requirements for this turbine are as follows:

- NO_x: 84.1 tpy and 110.3 ppmvd^{*} (Colorado Construction Permit 91RB570)
- CO: 9.6 tpy and 35.2 ppmvd** (Colorado Construction Permit 91RB570)
- VOC: 0.9 tpy (Colorado Construction Permit 91RB570)

 SO₂: 150 ppmvd^{**} (Colorado Construction Permit 91RB570, Regulation No. 6, Part A, Subpart GG)

*Corrected to 15% oxygen and ISO conditions (288°K, 60% r.h., 101.3 kPa)

**Corrected to 15% oxygen

- Maximum Allowable Sulfur Dioxide Emissions Standard (Regulation No. 1, Section VI.B.4.c.i): 0.8 lb SO₂/MMBtu
- Maximum Allowable Particulate Emissions Standard for fuel burning equipment (Regulation No. 1, Section III.A.1.b)

$$PE = 0.5(FI)^{-0.26}$$

Where: PE = Allowable Particulate emissions (lb/MMBtu)

FI = Fuel Input (MMBtu/hr)

- Fuel use limited to 315.4 MMscf/yr (Colorado Construction Permit 91RB570)
- Natural gas sulfur content shall not exceed 0.8 percent by weight (Colorado Construction Permit 91RB570, Regulation No. 6, Part A, Subpart GG)
- Sulfur content of the fuel being fired in the turbine shall be determined in accordance with Federal NSPS § 60.334, and established EPA Guidelines (Colorado Construction Permit 91RB570, Regulation No. 6, Part A, Subpart GG)
- General Provisions of NSPS Subpart GG (Colorado Construction Permit 91RB570, Regulation No. 6, Part A, Subpart A)
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

It should be noted that the NSPS GG requirements also include monitoring of nitrogen content in the fuel to determine fuel-bound nitrogen allowances. In a memorandum issued by EPA on August 14, 1987 (attached), nitrogen monitoring can be waived when natural gas is used as fuel.

2. Emission Factors

Emissions from this turbine are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and specific properties of the natural gas being burned. The pollutants of concern are NO_{x} CO and VOC. The manufacturer's emission factors listed below were converted from CIG's proposed factors as detailed on the attached Engineering Calculations worksheet.

	AP-42 Emission	Manufacturer's
<u>Pollutant</u>	Factor (lb/MMBtu)	Emission Factor (lb/MMBtu)
NO_x	0.34	0.50
CO	0.17	0.06
VOC	0.002	0.01

The manufacturer's emission factors are higher than the AP-42 (EPA Compilation of Air Pollutant Emission Factors, October 1996) emission factors for gas turbines from Table

3. Monitoring Plan

Emissions will be determined by multiplying the manufacturer's emission factors by fuel consumption. CIG will be required to conduct the emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification.

Quarterly portable monitoring is required as indicated by the turbine monitoring grid developed by the Division (attached) since the CO compliance emission factor for this turbine is less than the AP-42 emission factor and the turbine is subject to NSPS requirements. Flue gas analyzer testing for NO_x will also be required because the relationship between NO_x and CO emission rates from turbines is critical for determining turbine operating condition. Failure of a portable-analyzer test indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an actual EPA Reference Method stack test must then be performed.

Additionally, a performance test to determine compliance with NO_x and CO emission limits shall be conducted within twelve months of permit issuance in accordance with EPA Reference Methods 5 or 17 (Federal 40 CFR 60.675). Another stack test will be required within the last twelve months of the five year permit term.

The monitoring grid also includes a requirement for parametric monitoring. Based upon engineering judgement and historical compliance with Construction Permit limitations, this requirement is waived. Should the turbine ever exceed permit limitations in the future, parametric monitoring will be reconsidered.

NSPS GG requires that the fuel be analyzed for sulfur content and that the sulfur dioxide emissions cannot exceed 0.015% by volume @ 15% Oxygen on a dry basis and that the sulfur content of the fuel cannot exceed 0.8% by weight. Based on engineering judgement, the Division has determined that the exclusive use of natural gas as fuel will be sufficient to ensure compliance with these standards.

The heat content of the natural gas used to fuel this turbine shall be verified semi-annually in accordance with ASTM Analysis Method D1826-77 or equivalent. The heat content of the natural gas shall be based on the lowest gross heating value of the fuel. Calculations of emissions required under Condition 1.1. shall be made using the heat content derived from the most recent required analysis.

The Maximum Allowable Particulate Emissions Standard (Regulation No. 1, Section III.A.1.b) for these boilers are calculated below.

$$\mathbb{E} = 0.5(38.52)^{-0.25} = 0.99 \frac{b RM}{MRV}$$

AP-42 claims PM from gas-fired turbines are non-detectable with conventional protocols and supplies no emission factor for PM. Therefore, compliance with the Particulate Emissions Standard may be ensured by burning natural gas.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II. C.

4. Compliance Status

A current APEN reporting 1994 emissions for the turbine is on file with the Division. CIG certified in their application to the continued use of natural gas as the fuel for this unit to demonstrate compliance with the Opacity standard. A warning letter dated November 9, 1998 stated the following, 'The Division has determined that CIG failed to properly submit APENs and obtain construction permits for the two new turbines put into service on May 31, 1996 and June 21, 1998, in violation of Air Quality Control Commission Regulation No. 3, Part A, Section II.A. and Part B, Section III.A. and sections 25-7-114 and 114.2, C.R.S.' The serial number from this warning letter (SN:1469) has been used to identify the turbine currently at this facility.

Units E002 and E003 - Waukesha 4-Cycle Turbocharged Low-NO $_{\rm x}$ Internal Combustion Engine, Model 5108GL, S/N: C-11015/1 and C-11038/1, 6.2 MMBtu/hr, 787 hp, Natural Gas Fired.

1. Applicable Requirements

These engines were installed and began operation 1994. These units are permitted under final approval Colorado Construction Permits 94RB420-1, -2. The applicable requirements for these engines are the following:

- NO_x: 12.9 tpy (Colorado Construction Permits 94RB420-1, 2)
- CO: 22.9 tpy (Colorado Construction Permits 94RB420-1, 2)
- VOC: 8.6 tpy (Colorado Construction Permits 94RB420-1, 2)
- Fuel use per engine limited to 56.1 MMscf/yr (Colorado Construction Permits 94RB420-1, 2)
- 20% Opacity limitation during normal operations (Regulation No. 1, Section II.A.1)
- APEN Reporting (Regulation No. 3, Part A, Section II)

2. Emission Factors

Emissions from these engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and the specific properties of the natural gas being burned. The pollutants of concern are NO_x , CO and VOC. The manufacturer's emission factors listed below were converted from CIG's proposed factors as detailed on

the attached Engineering Calculations worksheet. They are lower than the AP-42 (EPA Compilation of Air Pollutant Emission Factors, October 1996) emission factors for 4-cycle rich burn engines from Table 3.2-1 for NO_x and CO, and higher for VOC. The manufacturer's emission factors were determined from a stack test conducted on July 17, 1995 for the engine with serial number C-11038/1 and used to calculate emission limits for Colorado Construction Permits 94RB420-1, 2.

AP-42 Emission		Manufacturer's		
<u>Pollutant</u>	Factor (lb/MMBtu)	Emission Factor (lb/MMBtu)		
NO_x	2.3	0.48		
CO	1.6	0.84		
VOC	0.03	0.32		

3. Monitoring Plan

CIG has proposed to calculate emissions for fee purposes based on fuel consumption and the manufacturer's emission factors listed above. They will be required to conduct emissions calculations on a monthly basis with semi-annual reports and an annual compliance certification. This is consistent with the Monitoring Grid developed by the Division (attached).

Since the manufacturer's emission factors for NO_x and CO are less than the AP-42 emission factors, portable monitoring on a quarterly basis is required to ensure that emission factors are representative of continued operation. Portable monitoring results will also be used to verify compliance with the hourly limitations for NO_x and CO. Failure of a portable analysis indicates a possible exceedance and a re-test is required using calibration gasses. Failure to show compliance during subsequent retests requires notification of the Division and an actual EPA Reference Method stack test must then be performed.

The heat content of the natural gas used to fuel these engines shall be verified semiannually in accordance with ASTM Analysis Method D1826-77 or equivalent. The heat content of the natural gas shall be based on the lowest gross heating value of the fuel. Calculations of emissions required under Condition 2.1. shall be made using the heat content derived from the most recent required analysis.

The Opacity standard of 20% will be demonstrated by the use of natural gas. Inspectors may verify this with EPA Method 9 opacity readings, if necessary.

A revised APEN must be submitted to the Division as required by Regulation No. 3, Part A, Section II. C.

4. Compliance Status

A current APEN reporting 1994 emissions for the two engines is on file with the Division. CIG certified in their application to the continued use of natural gas as the fuel for these

units to demonstrate compliance with the Opacity standard. Although a stack test was required for each engine, the Division accepts a single test in situations where the engines are identical. No records indicating non-compliance were found in a review of the facility's Division files and the source certified in their application that they are currently in compliance with all applicable requirements. Therefore, these units are currently considered to be in compliance with all applicable requirements.

IV. Insignificant Activities

Emissions from Venting during Engine Overhaul

CIG submitted calculations quantifying emissions from the release of natural gas during routine periodic maintenance of the compressor engines. Assuming 6,000 ft³ of natural gas was vented from each engine once per year, emissions of VOC were determined to be well below reportable deminimis levels.

Emergency Generator

The emergency generator on site has been identified as meeting the insignificant activity criteria of Regulation No. 3, Part C, Section II.E.3.nnn.

Fuel Burning Equipment

CIG identified combustion sources that qualify as insignificant activities under Regulation No. 3, Part C, Section II.E.3.k, gaseous fuel burning equipment with a design heat rate less than 5 MMBtu/hr. These units are listed in Appendix A in the Operating Permit.

Storage Tanks

CIG identified storage tanks that qualify as insignificant activities under Regulation No. 3, Part C, Section II.E.3.aaa, ddd, and fff. These units are listed in Appendix A in the Operating Permit.

Landscaping Devices

CIG also listed landscaping devices that qualify as insignificant activities under Regulation No. 3, Part C, Section II.E.3.bb. These units are listed in Appendix A in the Operating Permit.

V. Alternative Operating Scenarios

CIG has indicated that replacement engines are typically not used during major engine overhaul. They are aware that any temporary or permanent replacement of engines at this site shall not be conducted without prior notification to the Division. The Division will determine whether the proposed change at the site will require a Construction Permit and/or modification of the Operating Permit. Installation of equipment not specifically

identified in the Permit prior to notification to the Division shall be considered a violation subject to enforcement action.

VI. Permit Shield

The regulation citations identified as not applicable to this source in Section III of the Operating Permit are based on a condensed version of the requested Permit Shield citations as submitted with the original application for this facility. The original list contained many citations that were clearly unnecessary for the shield.

VII. Short Term Limits Deleted from Operating Permit

Construction Permit	Emission Unit	Short Term Limit	
91RB570	E001	NO _x :	16.6 lb/hr
		CO:	1.9 lb/hr
		VOC:	0.17 lb/hr
		Fuel:	31,100 scf/hr
94RB420-1, 2	E002 and E003	NO _x :	2.95 lb/hr
		CO:	5.22 lb/hr
		VOC:	1.97 lb/hr
		Fuel:	6,404 scf/hr